Petroleum Infrastructure - Overview & Short Term Outlook

Investigating the Causes of California's
Petroleum Infrastructure Development Constraints
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Gordon Schremp
Transportation Fuels Office
California Energy Commission

CALIFORNIA ENERGY COMMISSION

Presentation Topics

- Imports & infrastructure
  - Petroleum infrastructure – key elements
  - Imports & exports – historical perspective
  - Imports – look ahead
  - New projects
  - Need & timing for additional expansion
  - Changing trends for petroleum projects

Overview - Infrastructure

Petroleum Infrastructure – Key Elements

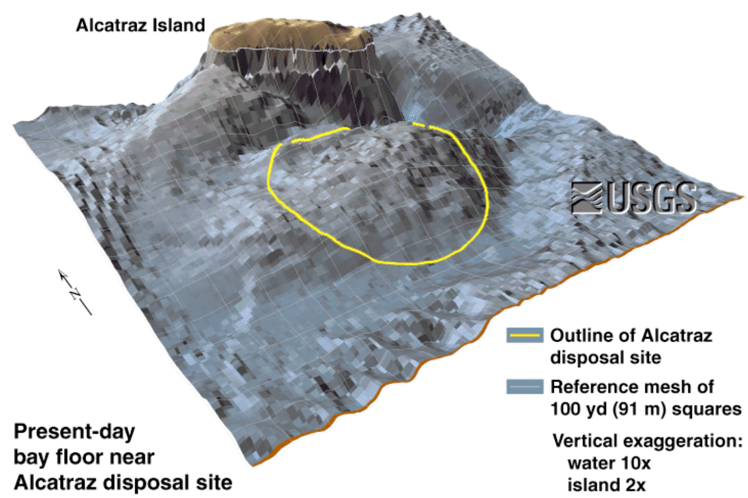
- The petroleum "infrastructure" consists of several interconnected assets operated by a combination of private and common carrier companies
  - Marine facilities
  - Refineries
  - Storage tanks
  - Pipelines
- Crude oil and petroleum product infrastructure assets are separate and distinct from one another – not interchangeable
- Unlike with the electricity distribution system, Northern California is not directly connected to Southern California

Key Elements – Marine Facilities

- Marine facilities are located in sheltered harbors with adequate draught to accommodate typical sizes of petroleum product tankers and crude oil vessels
- Wharves usually have adjacent storage tanks that are used to temporarily hold petroleum products prior to transfer to a subsequent location
- Most refiners operate a proprietary dock
- Third party storage provides access to majors and independents
  - Kinder Morgan
  - ST Services
  - Chemoil
  - Petro-Diamond

Key Elements – Marine Facilities (cont)

- Adequate dredging is a vital component to ensuring efficient use of marine facilities
- Inadequate draft can result in additional ship movements and more constraint
- Projects intended to increase draft are expected to allow larger vessels to move petroleum products, easing current and future congestion at marine docks



Key Elements - Refineries

- Refineries are a primary hub of logistical activity
  - Raw materials imported & finished products shipped
- Crude oil is received by pipelines and marine vessels
- Process units operate continuously at or near maximum capacity, except during periods of planned maintenance or unplanned outages

Key Elements – Refineries (cont)

- Output from the refineries is usually placed in intermediate tanks prior to blending the finished products
- The majority of gasoline, diesel and jet fuel is shipped from the refinery by pipeline to over 60 distribution terminals
- Most of the refineries dispense a smaller portion of their output into tanker trucks that are loaded at the refinery

Key Elements – Storage Tanks

- Storage tanks are vital to the continuous flow of petroleum products into and through California
- Tanks are located at docks, refineries, terminals and tank farms
- Tanks serve different storage purposes:
  - Unload marine vessels
  - Receive pipeline shipments
  - Feed truck loading facilities
  - Hold inventories in advance of planned maintenance
  - Strategic storage that can be used for emergencies or periods of rapid price increases

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Key Elements – Storage Tanks (cont)

- “Dedicated” tanks are normally used for only one type of petroleum product
- “Drain dry” tanks can be used to store different types of petroleum products throughout the year, increasing versatility and flexibility for the distribution infrastructure
- Renovation of existing or construction of new storage tanks will be necessary to adequately handle the additional influx of imports foreseen over the next 10 years and beyond
- Most, if not all, of these projects will occur in locations with existing tanks

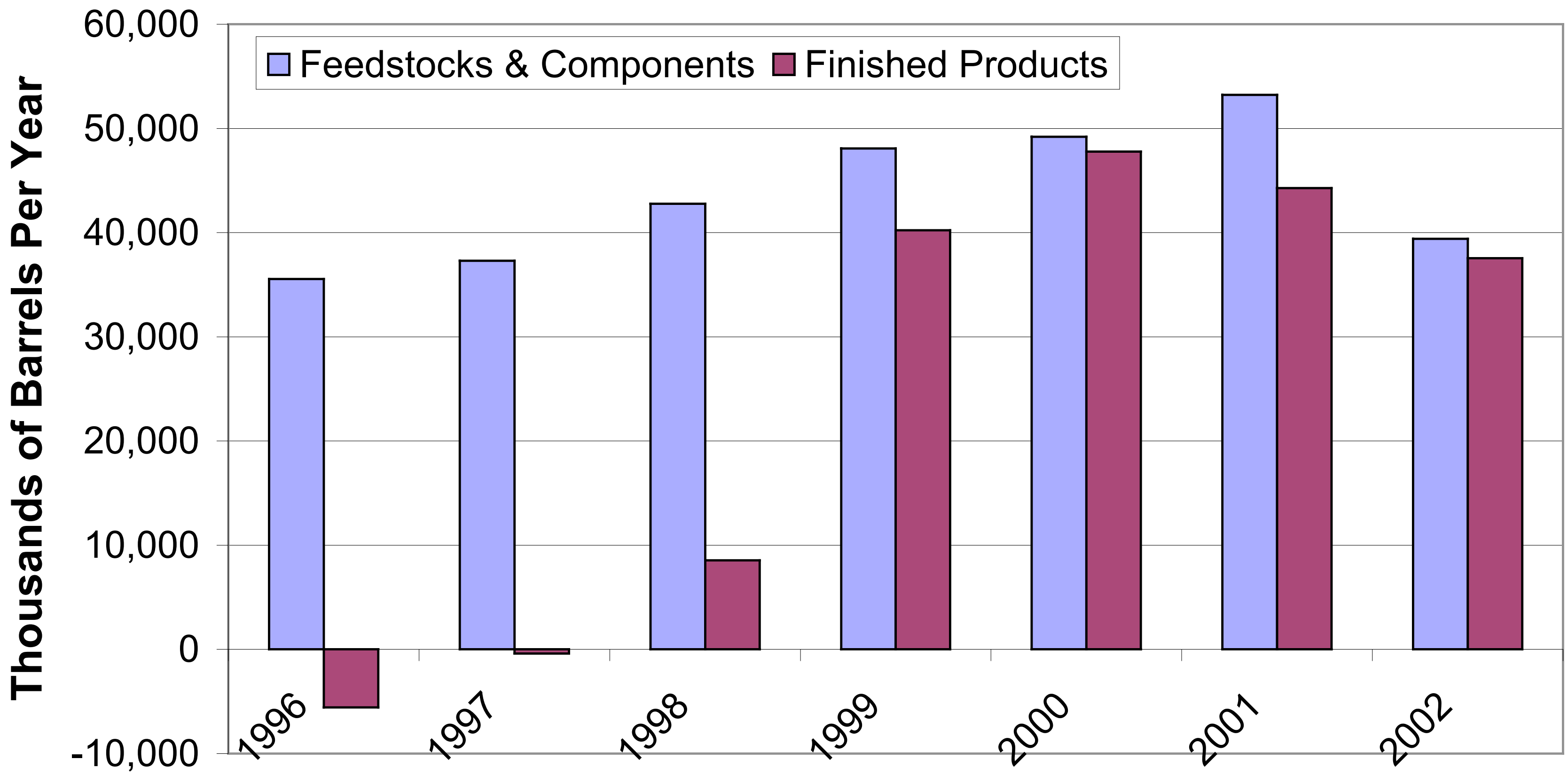
Key Elements – Pipelines

- Pipeline are used throughout the distribution infrastructure to interconnect key elements
- Intra-state pipelines are used to convey petroleum products within California's borders
- Interstate pipelines are used to export transportation fuels to Arizona and Nevada
- Pipelines usually include pump stations, break-out tanks, storage tanks and distribution terminals
- Pipelines normally traverse multiple jurisdictions and require longer periods of time to acquire all of the necessary permits

Imports & Exports - Historical

- California shifted from a net exporter of finished petroleum products (transportation fuels) by marine vessel to a net importer in 1997
- Imports of petroleum products are generally increasing while exports are continuing to decline
  - Combined marine imports increased by 61 percent between 1996 and 2001 before declining 22 percent between 2001 and 2002
    - 107 million barrels in 2002 or 294 thousand barrels per day (TBD)
  - Combined marine exports declined by 45 percent between 1996 and 2002
    - 30 million barrels in 2002 (84 TBD)

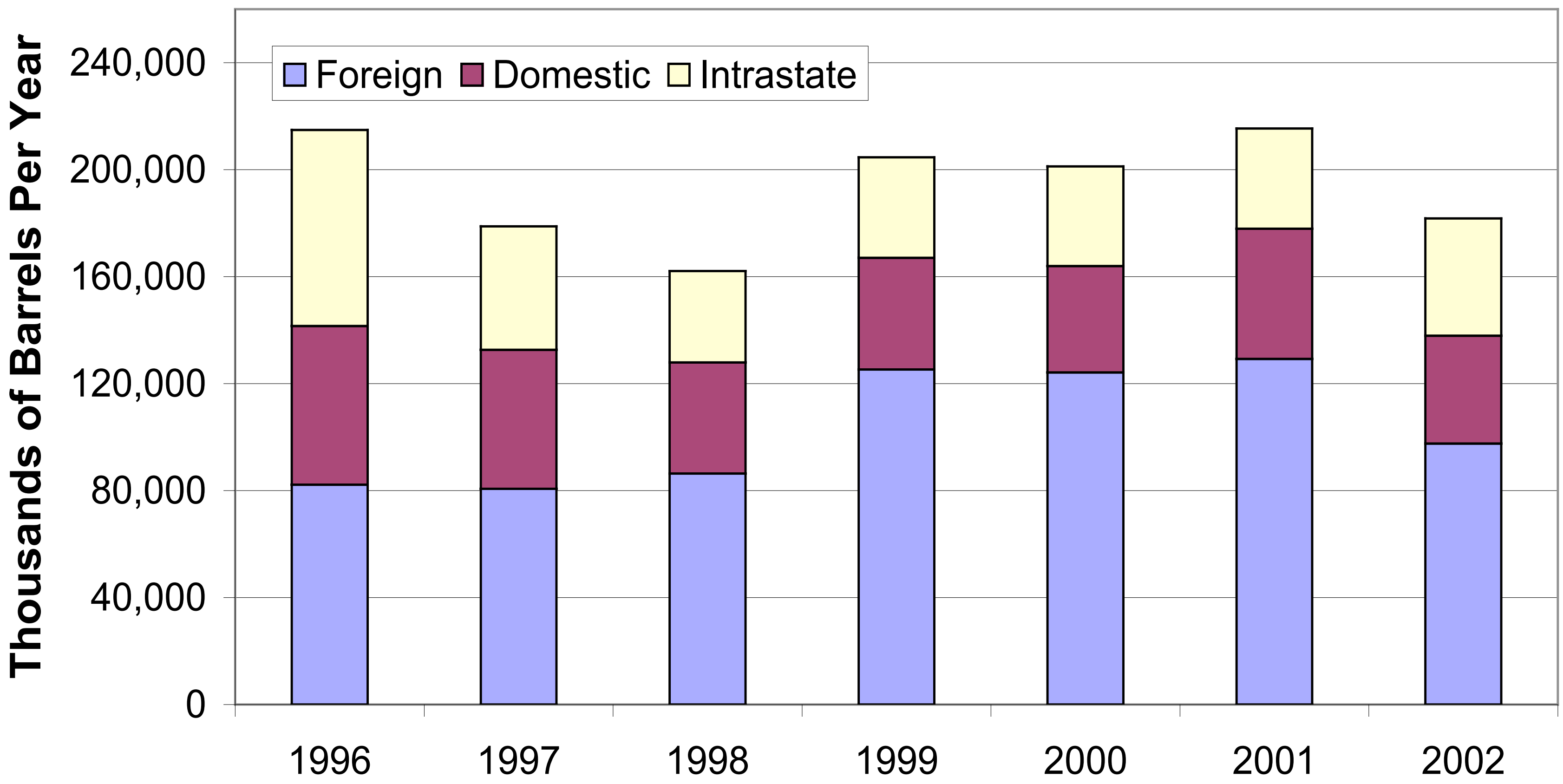
California Petroleum Net Imports Refinery Feedstocks, Blending Components and Finished Products (Excludes Crude Oil) 1996 through 2002



Imports & Exports – Historical (cont)

- Exports and imports of like petroleum products use similar facilities
  - Ships loading products occupy dock space and can prevent another vessel from unloading a cargo of fuel
  - Domestic movements – 40 million barrels in 2002 or 110 TBD
  - Foreign movements – 98 million barrels in 2002 or 268 TBD
- Intrastate movements also contribute to congestion at docks
  - Barges are a primary means of transport
  - Intrastate movements – 44 million barrels in 2002 or 121 TBD

California Petroleum Combined Movements Refinery Feedstocks, Blending Components and Finished Products (Excludes Crude Oil) 1996 through 2002



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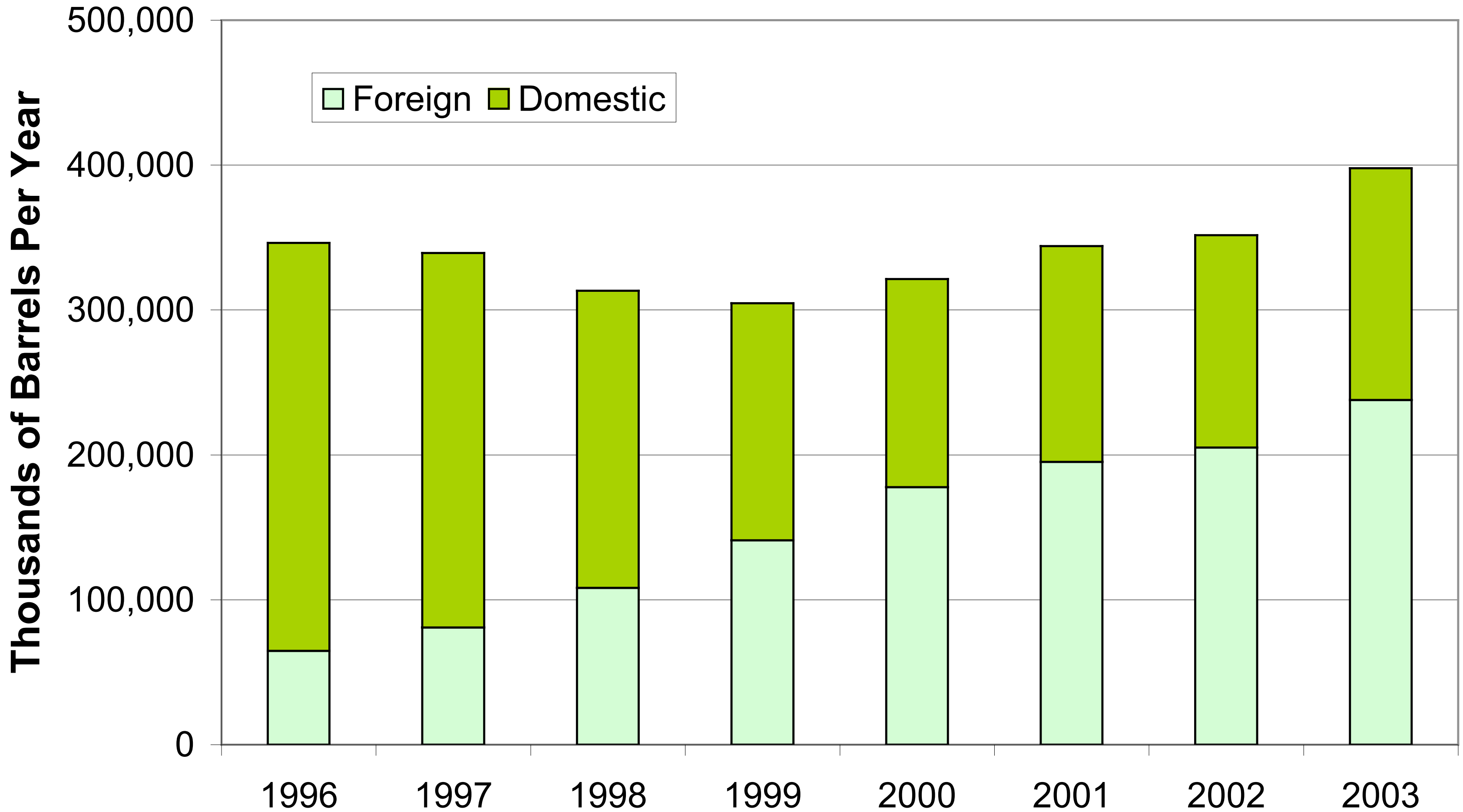
Imports & Exports – Historical (cont)

- Imports of crude oil have continued to increase as California crude production falls and refineries process additional oil
- Total imports of crude oil have only increased 15 percent between 1996 and 2003.
- But the rate of increase has been more dramatic since 1999
  - 6.9 percent per year increase
- Imports of Alaska crude oil declined a total of 43 percent between 1996 and 2003, although imports rose a modest 9 percent between 2002 and 2003
- The largest increase has been for foreign crude oil imports
  - 21 percent per year increase

California Crude Oil Imports
1996 through 2002



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Imports & Exports – Historical (cont)

- Various factors impact these petroleum product totals
  - Refinery reliability
    - Greater number of outages/planned maintenance can increase need for imports & intrastate movements
  - Health of the economy
    - Jet fuel imports declined 12 million barrels between 2000 and 2002
  - Improved efficiency through exchange agreements can help
  - Modest refinery projects also contribute incremental supply

Imports – Look Ahead

- The Energy Commission has previously evaluated the marine logistics and determined that the infrastructure to handle imports is becoming constrained
  - New study for the 2005 IEPR will focus on bottlenecks that could impact logistical movements at the water and further inland
- Southern California facilities are estimated to receive the bulk of the additional imports – both crude oil and petroleum products
- Adequate access to marine import infrastructure is an important factor

Imports – Look Ahead (cont)

- New projects underway or close to approval will augment supply and expand portions of the existing infrastructure
- But additional projects will likely be necessary to ensure that forecasted growth of imports can be accommodated without interruption of crude oil or transportation fuel supplies
- Pace and scope of these new infrastructure projects is the key concern

New Projects – Marine Facilities

- Crude oil import infrastructure projects being discussed for the Ports of Los Angeles and Long Beach
- Pacific Energy Partners looking to develop Pier 400 in the Port of Los Angeles
- Creation of a deep water crude import facility in Long Beach is also being examined
- Either development would require additional tankage and pipeline infrastructure

New Projects – Refineries

- Paramount Petroleum project to produce California gasoline and diesel fuel
- Permit approved June 18, 2004
- New production of gasoline and diesel fuel could begin by January of 2005
- 7.5 TBD of gasoline and 8.7 TBD of diesel fuel important supply additions
- Can help to offset loss of production if Shell facility in Bakersfield closes by October 1, 2004

New Projects – Storage Tanks

- Kinder Morgan project to expand their existing Carson storage facility in Southern California
- Could eventually add 19 new storage tanks over a 15 year period
- 1.5 million barrels of additional storage capacity
- Approval of conditional use permit appealed
- Request by KMP that the issue be continued to augment EIR
- Project now delayed at least 9 – 12 months

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New Projects – Pipelines

- Kinder Morgan North Line expansion project initiated July of 2001
- Pipeline transports petroleum products from Concord to West Sacramento
- Main line construction began first week of June 2004
- New pipeline should become operational by end of year
- Project will increase capacity by over 30 percent and will satisfy growth for the next 10 to 20 years

Need & Timing for Additional Expansion

- The level of activity underway for new and planned projects is encouraging, but additional capacity expansion and elimination of key bottlenecks will be necessary to ensure adequacy of supply
- As discussed earlier, California's demand for transportation fuels is outpacing refinery capacity growth
- Imports of refinery feedstocks and blending components will continue to grow
  - Increased volume equivalent to a new refinery every 4 years
- Crude oil imports are also forecast to rise as California oil production continues to decline
  - Increasing by an additional 8 million barrels each year

Changing Trends

- Trends of increasing import needs and modest refinery projects could signal a shift in the nature of petroleum infrastructure projects
- Over the last decade, the majority of significant projects have centered around refineries
- Major refinery projects to comply with regulatory changes are not anticipated over the next decade
- Rather, the need for petroleum infrastructure projects is anticipated to grow in number and scope
- This new paradigm could shift the focus of many new projects away from the refineries and involve new stakeholders & regulators